United States of America

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 1.29: to consider the results of studies related to Resolutions **136 (WRC-2000)** and **78 (WRC-2000)** dealing with sharing between non-GSO and GSO systems;

Background Information: Resolution **136** invited the ITU-R to undertake the appropriate technical, operational, and regulatory studies on sharing arrangements in order to achieve an appropriate balance between GSO FSS networks and non-GSO FSS systems in the 37.5-50.2 GHz frequency range.

Both GSO FSS networks and non-GSO FSS systems are planned for operation within the 37.5-42.5 GHz and 47.2-50.2 GHz bands. FSS systems based on the use of new technologies associated with both geostationary and non-geostationary orbits are capable of providing both the most densely populated and the most isolated regions of the world with high capacity and low-cost means of communications. WRC-2000, recognizing that there had been little or no deployment of satellite systems in the band 37.5-50.2 GHz, correctly concluded in Resolution **136 (WRC-2000)** that both GSO FSS and non-GSO FSS operators should be expected to exhibit flexibility in achieving the appropriate balance in the sharing environment, and urged administrations, in the application of Article **22** to their GSO FSS networks and non-GSO FSS systems in this range prior to WRC-03, to seek balanced sharing arrangements. Since WRC-2000, progress was made in compiling information on the characteristics of both GSO networks and non-GSO FSS systems planned to operate in the 40/50 GHz bands. At the same time, it was recognized that if no techniques were employed to avoid direct coupling between the main beams of satellites in a non-GSO system and the main beams of earth stations in a GSO network, and vice versa, during the short periods when "in-line" transitions occur, the interference in both directions, which is likely to be modest for the majority of the time, would rise sharply by many dB for short periods aggregating to small percentages of time.

To date the ITU-R work done for the 40/50 GHz bands has been fairly limited. One new recommendation discusses the use of orthogonal polarizations and other techniques as potential means of sharing between GSO networks and non-GSO systems in this frequency range. However, the levels of acceptable interference for GSO FSS networks and non-GSO systems were not fully assessed. Moreover potentially available mitigation techniques such as satellite diversity or arc avoidance, geographic isolation between earth stations, etc., cannot be easily translated into regulatory provisions that may require the development of a set of epfd masks to protect GSO FSS networks and of off-axis e.i.r.p. density masks to protect non-GSO FSS systems.

In most cases sharing between a GSO FSS network and a non-GSO FSS system of the LEO or MEO type will be feasible only if mitigation techniques to avoid main beam-to-main beam coupling of "in-line" interference are applied. Such techniques could include, for example:

- Satellite diversity or arc avoidance;
- Geographical isolation between earth stations;
- Adaptive coding;
- Link balancing
- Use of orthogonal polarizations.

It is considered premature to conclude on the advantages and disadvantages of each technique until the further studies have been accomplished. There is no need for modifications in Article 22 at this time. Instead, modification of Resolution 136 (WRC-2000) is required to reflect a new date for completion of studies and action by a future Conference, and the addition of an appropriate item to a future WRC agenda.

Proposal:

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RESOLUTION 136 (WRC-2000REV WRC-03)

Frequency sharing in the range 37.5-50.2 GHz between geostationary fixed-satellite service networks and non-geostationary fixed-satellite service systems

The World Radiocommunication Conference **(**~~Istanbul, 2000~~Geneva, 2003**)**

considering

a) that ~~this Conference has~~WRC-2000 made provisions for the operation of geostationary fixed-satellite service (GSO FSS) networks and non-GSO FSS systems in the 10-30 GHz frequency range;

b) that there is an emerging interest in operating GSO FSS networks and non-GSO FSS systems in the 37.5-50.2 GHz range;

c) that there is a need to provide for the orderly development and implementation of new satellite technologies in the 37.5-50.2 GHz frequency range;

d) that systems based on the use of new technologies associated with both GSO FSS networks and non-GSO FSS systems are capable of providing the most isolated regions of the world with high-capacity and low-cost means of communication;

e) that there should be equitable access to the radio frequency spectrum and orbital resources in a mutually acceptable manner that allows for new entrants in the provision of services;

f) that the Radio Regulations should be sufficiently flexible to accommodate the introduction and implementation of innovative technologies as they evolve;

g) that ~~the CPM Report to WRC-2000 stated that~~ in the bands 37.5-50.2 GHz, where there has been little or no deployment of satellite systems to date, both GSO FSS and non-GSO FSS operators should be expected to exhibit flexibility in achieving the appropriate balance in the sharing environment~~,~~;

h) that this Conference, having considered the outcome of ITU-R studies on this subject as summarized in the CPM Report to this Conference, decided that further studies are needed before

the conditions for non-GSO FSS systems to share these bands with GSO FSS systems can reliably be determined,

resolves to urge administrations

in the application of Article **22** to their GSO FSS networks and non-GSO FSS systems in the 37.5-50.2 GHz frequency range prior to WRC-~~03~~06, to seek balanced sharing arrangements between these systems,

invites ITU-R

~~1~~ to undertake, as a matter of urgency, ~~the appropriate~~ further technical, operational and regulatory studies on sharing arrangements which achieve an appropriate balance between GSO FSS networks and non-GSO FSS systems in the frequency range 37.5-50.2 GHz. Such further studies should embrace, but not necessarily be limited to:

a) Techniques which individually or in combination avoid, or otherwise adequately mitigate, main beam-to-main beam coupling of interference in both directions between non-GSO FSS and GSO FSS systems at "in-line" instants. The studies should be based on the key parameters of systems firmly planned to operate in the bands concerned, and should be pursued sufficiently far to establish appropriate long-term and short-term interference criteria and to compute the time statistics of interference from non-GSO system to GSO network, and from GSO network to non-GSO system, to determine whether those criteria would be met. The computations and comparisons should be made firstly assuming no mitigation, and subsequently with each of the various mitigation techniques or combinations of mitigation techniques envisaged. The mitigation techniques thus investigated should include:

- Satellite diversity or arc avoidance.
- Geographical isolation between earth stations.
- Site diversity.
- Adaptive coding.
- Link balancing.
- Opposite polarizations for GSO and non-GSO systems.
- Other appropriate techniques, if any.

b) The development of technical, operational and regulatory guidance which would enable WRC-06 to decide whether or not to include, in the Radio Regulations, epfd limits on non-GSO FSS systems for the protection of GSO FSS networks, and off-axis e.i.r.p. density limits on earth stations in GSO FSS networks for the protection of non-GSO FSS systems, in the frequency range 37.5-50.2 GHz. Such guidance should include quantitative values for suitable $epfd_{\downarrow}$, $epfd_{\uparrow}$ and off-axis e.i.r.p. density limits;

~~2 to report the results of these studies to WRC-03.~~

instructs the Director of the BR

to report the results of these studies to WRC-06.

Reasons: To allow additional time for the completion of the necessary ITU-R studies.

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